

N<sup>o</sup> 9610



A.D. 1901

*Date of Application, 8th May, 1901—Accepted, 8th June, 1901*

COMPLETE SPECIFICATION.

Communicated from abroad by ALBERT WILLIAMSON COURTNEY, of 147 Niagara Street, Buffalo, New York, United States of America, Manufacturer of Medical and Electrical Specialties.

“ Improvements in Electrical Exercising Machines ”

I, HENRY HARRIS LAKE, of the Firm of Haseltine, Lake & Co., Patent Agents, 45 Southampton Buildings, in the County of Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 This invention relates to that class of electric exercising machines which comprise a magnetic-electric generator having its armature-shaft provided with driving-pulleys, combined actuating-cords and electrical conductors passing around said pulleys and terminating in metallic handles, whereby the cords are drawn over the pulleys for rotating the armature and which form the body-  
10 contacts or electrodes of the generator-circuit, and a spring or other suitable resisting medium connected with the pull-cords for opposing the pulling force of the operator and effecting the return stroke of the cords.

One of the objects of my invention is to provide an exercising-machine of this character in which a current is produced not only during the downward  
15 stroke of each pull-cord, but also during the upward or return stroke of each cord, so as to maintain a practically continuous current during the operation of the machine regardless of whether the cords are pulled separately or together.

My invention has the further objects to combine with the apparatus an auxiliary electrical conductor and a switch of simple and convenient construction, whereby  
20 the current may be passed through the feet and the limbs as well as the upper part of the body, if desired, and to provide simple means for increasing or diminishing the strength of the current passed through the operator's body.

In the accompanying drawings:

Figure 1 is a perspective view of my improved exercising-apparatus. Figure 2  
25 is a diagram showing the various circuits. Figure 3 is a vertical section of the machine, taken lengthwise through the armature-shafts. Figure 4 is a vertical section in line 4—4, Figure 3, showing one of the circuit-breakers.

Like letters of reference refer to like parts in the several figures.

A is a rectangular box or casing, which encloses the magnetic-electric generator  
30 and which is attached at a suitable elevation to a wall or other support.

B, B are two permanent or field magnets arranged side by side in the casing, and C, C, are a pair of rotary armatures arranged within said magnet, respectively. Each of these armatures is provided with a hollow metallic shaft *c*, which is formed in one piece with the metallic body of the armature or secured  
35 thereto and which turns upon a fixed shaft or spindle D. This fixed shaft extends through the side walls of the casing A, and its ends are secured to brackets or hangers D<sup>1</sup>, which are fastened to said side walls. The hollow shafts of the armatures are separately mounted on the fixed shaft D, but in electrical contact therewith, and they pass through the side walls of the casing, their ends being  
40 seated in bearings or recesses, formed in the inner sides of the brackets D<sup>1</sup>, as shown in Figure 3.

E, E are grooved driving-pulleys secured to the projecting portions of the respective hollow shafts *c*, and *f, f* the combined pull-cords and flexible electric

[Price 8d.]



*Lake's Improvements in Electrical Exercising Machines.*

conductors which run over said pulleys. The front branches of these cords terminate in electrodes or metallic handles *F*, which are connected with the usual conducting-wires contained in the cords, while the rear branches of the cords are doubled in the form of loops *f*<sup>1</sup> and pass through the bottom of the casing. The rear branches are electrically connected with contacts *g*, *g*<sup>1</sup>, arranged at the bottom of the case. 5

*H* is the usual elastic resisting-cord, which is looped around a hook *h*, secured to the floor or other support, and which is provided at its ends with hooks *h*<sup>1</sup>, which are attached to the forks of guide-pulleys *h*<sup>2</sup>, arranged in the bights of the cord loops *f*<sup>1</sup> in a well-known manner. The coils or windings of the armatures are electrically connected at one end to the hollow shafts *c* of the armatures and at the opposite ends to metallic rings *i*, *i*<sup>1</sup>, respectively, which rings are secured to said shafts, but insulated therefrom. 10

*i*<sup>2</sup>, *i*<sup>3</sup> are contact springs or brushes secured to the rear wall of the casing and bearing against the peripheries of the insulated rings *i*, *i*<sup>1</sup>. The contact-brush *i*<sup>3</sup> is connected with the cord-contact *g*<sup>1</sup> by a wire *i*<sup>4</sup>, while the other contact-brush *i*<sup>2</sup> is connected with a contact spring or switch *j* by a wire *j*<sup>1</sup>. This switch-spring is secured at one end to an insulating-block *k*, and its opposite free end normally rests upon the contact *g*. When the switch-spring *j* bears upon the contact *g* and the operator reciprocates the handles *F*, the current passes from one of the hollow armature shafts through the coil of one of said armatures to the contact-ring *i*<sup>1</sup>, the brush *i*<sup>3</sup>, wire *i*<sup>4</sup>, contact *g*<sup>1</sup>, right-hand cord *f* and handle *F*, the operator's body, the left-hand handle *F* and cord *f*, the contact *g*, switch-spring *j*, wire *j*<sup>1</sup>, contact-brush *j*<sup>2</sup>, ring *i*, the coil of the other armature, and the fixed shaft *D* back to the hollow shaft of the first-named armature. This circuit will be hereinafter referred to as the "arm-circuit". 15 20 25

The switch-spring *g*<sup>1</sup> is secured at one end to the block *k*, and its free end is arranged under the contact *g*, so that said switch-spring may be pressed upwardly against said contact, as shown in Figure 2. This switch-spring is normally out of contact with the contact *g*, as shown in Figure 3. 30

*L* is the foot-plate or auxiliary electrode upon which the operator stands when the electric current is to be passed through the legs and the trunk of the body, as well as through the arms. With this plate is connected an insulated wire or flexible conductor *M*, terminating in a switch-plug *M*<sup>1</sup>, having a metallic core and a surrounding body of insulating material. This plug is adapted to be passed upwardly through an opening *n*, formed in the bottom of the casing opposite the switch-spring *g*<sup>1</sup> and *j*, and also through an opening *n*<sup>1</sup>, formed in the lower switch-spring *g*<sup>1</sup> in line with the opening *n*, so that upon pushing said plug into said openings the metallic upper end of the plug strikes the upper switch-spring *j* and lifts its free end off the contact *g*, as shown in Figure 2, thereby interrupting the connection between said upper switch-spring and said contact and at the same time establishing an electrical connection between said spring and the foot-plate *L* through the switch-plug and the conducting-wire *M*. The switch-plug *M*<sup>1</sup> is provided at a distance from its front end with an insulated shoulder or enlargement *m*, which comes in contact with the under side of the lower switch-spring *g*<sup>1</sup> and presses the latter against the contact *g* upon inserting the plug in its openings, as shown in Figure 2. When the switch-plug is thus inserted and the operator stands on the foot-plate and operates one or both handles *F*, the current passes from the armature-shafts through the right-hand contact-ring *i*<sup>1</sup>, brush *i*<sup>3</sup>, wire *i*<sup>4</sup>, right-hand cord *f* and handle *F*, the operator's body, the foot-plate *L*, conducting-cord *M*, switch-plug *M*<sup>1</sup>, switch-spring *j*, wire *j*<sup>1</sup>, contact-brush *i*<sup>2</sup>, and ring *i* back to the armatures. The left-hand cord *f* is also switched into the circuit by the contact of the lower switch-spring *g*<sup>1</sup> with the contact *g*, the current thus dividing at the contact *g*<sup>1</sup> and passing through both arms of the operator if he grasps both of the handles *F*. This circuit will be hereinafter referred to as the "combined arm and foot" circuit. 35 40 45 50 55

In order to intensify the effect of the current, a pair of circuit-breakers of any



*Lake's Improvements in Electrical Exercising Machines.*

suitable construction are preferably arranged in a shunt around the generator-circuit. The circuit-breakers shown in the drawings consist of a pair of toothed or star wheels  $o o^1$ , secured to the hollow armature-shafts, respectively, and electrically connected therewith, and metallic spring fingers or brushes  $o^2 o^3$ ,  
 5 secured to the casing and bearing at their free ends against the teeth of the star-wheels in such manner that the springs snap over the teeth successively by the rotation of the wheels in either direction. The brushes  $o^2 o^3$  are connected with the insulated contact-rings  $x^2 x^3$  by wires  $o^4 o^5$ . Whenever by the rotation of the star-wheels one of these brushes comes in contact with a tooth of the corresponding  
 10 star-wheel a circuit is established through the coils of the armatures and the latter are short-circuited, while during the instant that the brush is snapping from one tooth to the next it is out of contact with the star-wheel and the circuit through the brush is broken and established through the electrodes and the body of the operator. By this arrangement every time that the circuit is established  
 15 through the handles F or through the handles and the foot-plate L a current is produced which, as is well known, is of much higher electromotive force than that generated directly by the rotation of the armature in the field-magnets, giving the operator a succession of comparatively strong shocks.

For the purpose of enabling the strength of the current received by the operator  
 20 to be graduated or reduced below the maximum more or less a shunt-circuit containing a number of connected resistance-coils  $p, p^1, p^2$  is combined with the main circuit. These resistance-coils are preferably mounted on the front plate of the casing A and connected, respectively, with the shanks of contact-buttons  $p^3, p^4, p^5, p^6$ , which extend through the front plate of the casing.  $p^7$  is  
 25 a dead-button arranged at the rear end of the series of buttons and having no connection with the shunt or the main circuit. The first active button  $p^3$  of the series is connected by a wire  $q$  with a contact  $q^1$ , which is secured to the inner side of the front plate of the casing and which is adapted to bear against an internal contact  $q^2$  secured to the top board of the casing when the front plate is  
 30 in place. The contact  $q^2$  is connected with the adjacent contact-brush  $o^2$  by a wire  $q^3$ .

$r$  is a switch-lever pivoted by a pin  $r^1$  to the front plate of the casing and arranged to traverse the contact-buttons  $p^3 p^7$ . The pivot of this lever is connected by a wire  $s$  with a contact  $s$ , preferably secured to the inner side of the  
 35 front plate of the casing and bearing against a contact  $s^2$  at the top of the case when said front plate is in place. This contact  $s^2$  is connected with the other brush  $o^3$  by a wire  $s^3$ .

When the shunt-circuit is switched into the main circuit, the strength or pressure of the current received by the operator is greater or less, according to  
 40 the amount of resistance included in the shunt-circuit, the same being greater when the resistance is increased and less when the resistance is reduced. When the switch-lever  $r$  is moved upon the first active button  $p^3$ , the exercising-current is short-circuited, and no appreciable current passes through the same. When the lever is shifted upon the second active button  $p^4$ , the first resistance-coil  $p$ ,  
 45 is included in the shunt-circuit, and the resistance offered by said circuit is increased accordingly, thereby increasing the amount of current received by the operator in the same measure. The strength of the current passing over the exercising-circuit is still further increased by shifting the lever upon the third button  $p^5$  or the fourth button  $p^6$ . Upon shifting the lever upon the dead-  
 50 button  $p^7$  the shunt-circuit is cut out altogether, and the operator receives the maximum strength of the current. When it is desired to pass the current only through the arms and the upper portion of the body, the arm-circuit is established by removing the switch-plug M from its socket. The operator then grasps the handles F and reciprocates the same either together, alternately, or one at a  
 55 time, according to the nature of the particular exercise desired or the fancy of the operator. If it is desired to use both the arm and the foot circuits, the operator simply inserts the switch-plug M<sup>1</sup> in its socket, as hereinbefore described.



*Lake's Improvements in Electrical Exercising Machines.*

By combining two armatures and magnets, as herein shown, a current is produced and maintained as long as one or the other of the cords is reciprocated, and a current is produced during the upward or return stroke as well as during the downward or pulling stroke of the handles. This enables the operator to exercise either arm alone or both arms at the same time or alternately, as desired, 5 and at the same time maintain a continuous current, and this result is attained without the use of pawls and ratchets or similar clutch devices, which increase the cost of the apparatus and are liable to get out of order and which produce no current during the return stroke of the pull-cord.

While I have herein shown the auxiliary-plate or electrode L as a foot-plate, 10 it is obvious that the same could be applied to other parts of the body.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, as communicated to me by my foreign correspondent, I declare that what I claim is:—

1. In an electric-exercising-machine, the combination with a pair of magnets 15 and a pair of electrically-connected rotary armatures co-operating therewith, and mounted on independent shafts each of which is provided with a driving-pulley and conducting and actuating cords running around said pulleys and provided at one end with electrodes or body-contacts and having their opposite ends connected with the armature coils, substantially as set forth. 20

2. In an electric-exercising-machine, the combination with a casing and a pair of permanent magnets arranged therein, of a main shaft arranged in the casing and extending through the side walls thereof, brackets secured to the outer sides of the casing and supporting the projecting ends of said shaft, a pair of rotary armatures co-operating with said magnets and mounted on independent 25 hollow shafts which turn on said main shaft and extend through the walls of the casing, driving-pulleys secured to the projecting portions of said hollow shafts, and conducting and actuating cords running around said pulleys and provided at one end with electrodes or body-contacts and having their opposite ends connected with the armature-coils, substantially as set forth. 30

3. In an electric exercising-machine, the combination with an electric generator having its armature-shaft provided with driving-pulleys, of conducting and actuating cords passing around said pulleys and provided at one end with electrodes or body-contacts and having their opposite ends connected with the armature-coils, a switch-member included in the same circuit with said cords for 35 establishing or breaking said circuit, and an auxiliary cord or conductor provided at one end with an electrode or body-contact, and at its opposite end with a contact adapted to come in contact with said switch member, substantially as set forth.

4. In an electric exercising-machine, the combination with an electric generator 40 having its armature-shaft provided with a driving-pulley, of conducting and actuating cords passing around said pulleys and provided at one end with electrodes or body-contacts and having their opposite ends connected with the armature-coils, a switch member and a co-operating contact included in the same circuit with said cords for establishing or breaking said circuit, a second 45 switch member arranged opposite said first-named switch member and said contact, and connected with a branch of said circuit, and an auxiliary cord or conductor provided at one end with an electrode or body-contact and at its opposite end with a switch-plug which is adapted to come in contact with said first-named switch member and disconnect the same from said contact, and which 50 is constructed to engage against said second-named switch member and move the same against said contact, substantially as set forth.

5. In an electric exercising-machine, the combination with an electric generator having its armature-shaft provided with driving pulleys, of conducting and actuating cords passing around said pulleys and provided at one end with elec- 55



---

*Lake's Improvements in Electrical Exercising Machines.*

---

trodes or body-contacts and having their opposite ends connected with the armature-coils, a switch-spring and a co-operating contact included in the same circuit with said cords, a second switch-spring arranged opposite the first-named switch-spring and said contact and provided with an opening and connected with  
5 a branch of said circuit, and an auxiliary cord or conductor provided at one end with an electrode or body-contact and at its opposite end with a switch-plug which is adapted to pass through the opening of said second-named switch-spring and make contact with said first-named switch-spring and which is provided with a shoulder or projection adapted to engage against said second-named switch-  
10 spring and move the same against said contact, substantially as set forth.

6. In an electric exercising-apparatus, the combination with an electric generator having its armature-shaft provided with driving-pulleys, of actuating and conducting cords passing around said pulleys, provided with electrodes and included in the generator-circuit, a shunt-circuit containing a resistance, and a  
15 switch arranged to cut said shunt-circuit into or out of the generator-circuit, substantially as set forth.

7. In an electric exercising apparatus, the combination with an electric generator having its armature-shaft provided with driving-pulleys, of actuating and conducting cords passing around said pulleys, provided with electrodes and included  
20 in the generator-circuit, a shunt-circuit containing a number of resistance-coils each having one of its terminals connected with a contact, and a switch-lever connected with one of the terminals of said shunt-circuit and arranged to traverse said coil-contacts, substantially as set forth.

8. In an electric exercising-apparatus, the combination with a pair of magnets  
25 and a pair of rotary armatures having separate shafts which are provided with driving pulleys, of actuating and conducting cords passing over said pulleys and included in the armature-circuit, an auxiliary circuit connected with each armature-coil and containing a make-and-break device, a shunt-circuit connected with both of said armature-circuits and containing a resistance, and a switch for cutting  
30 said shunt-circuit into and out of the generator-circuit, substantially as set forth.

Dated this 8th day of May 1901.

HASELTINE, LAKE & Co.  
45 Southampton Buildings, London, W.C.,  
Agents for the Applicant.

---

Redhill: Printed for His Majesty's Stationery Office, by Malcomson & Co., Ltd.—1901.







Fig. 1.

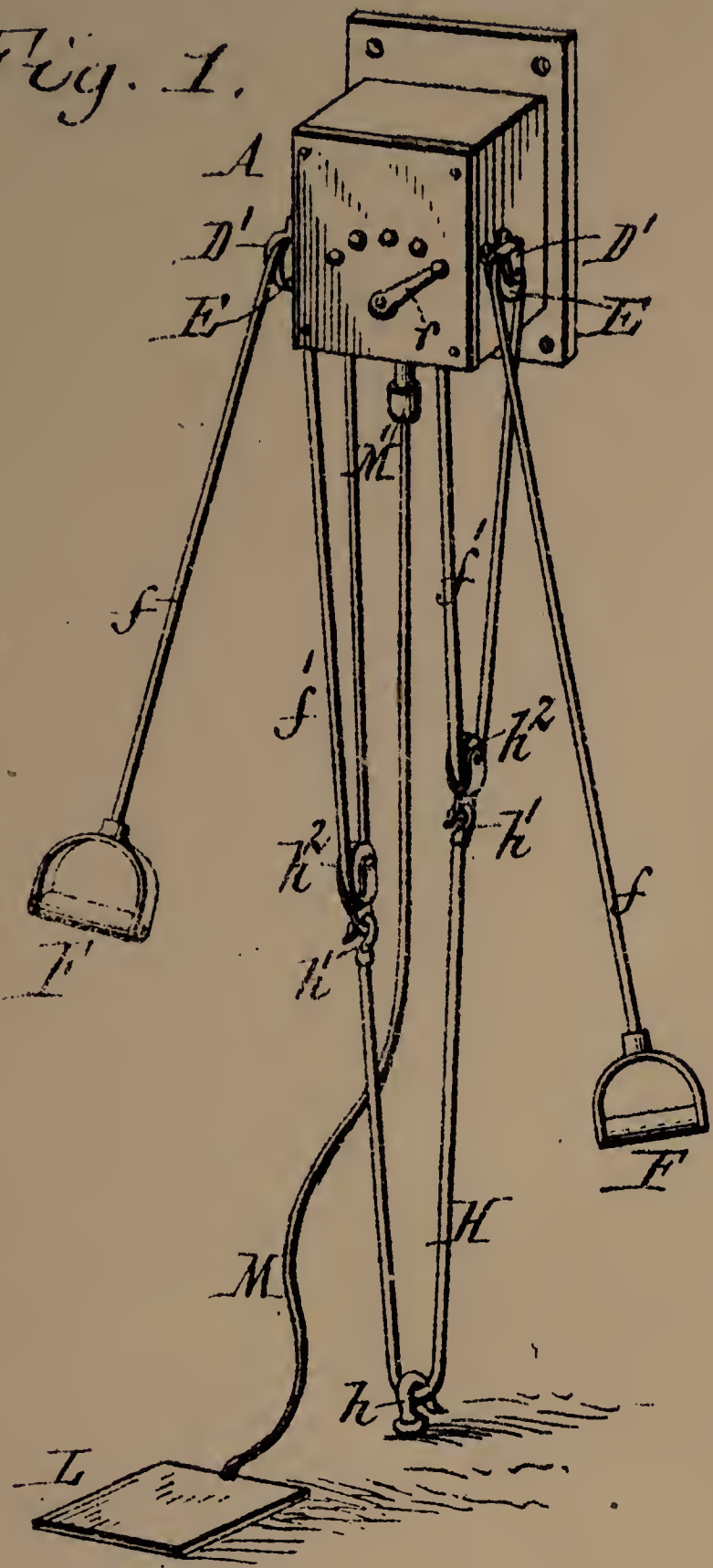


Fig. 2.

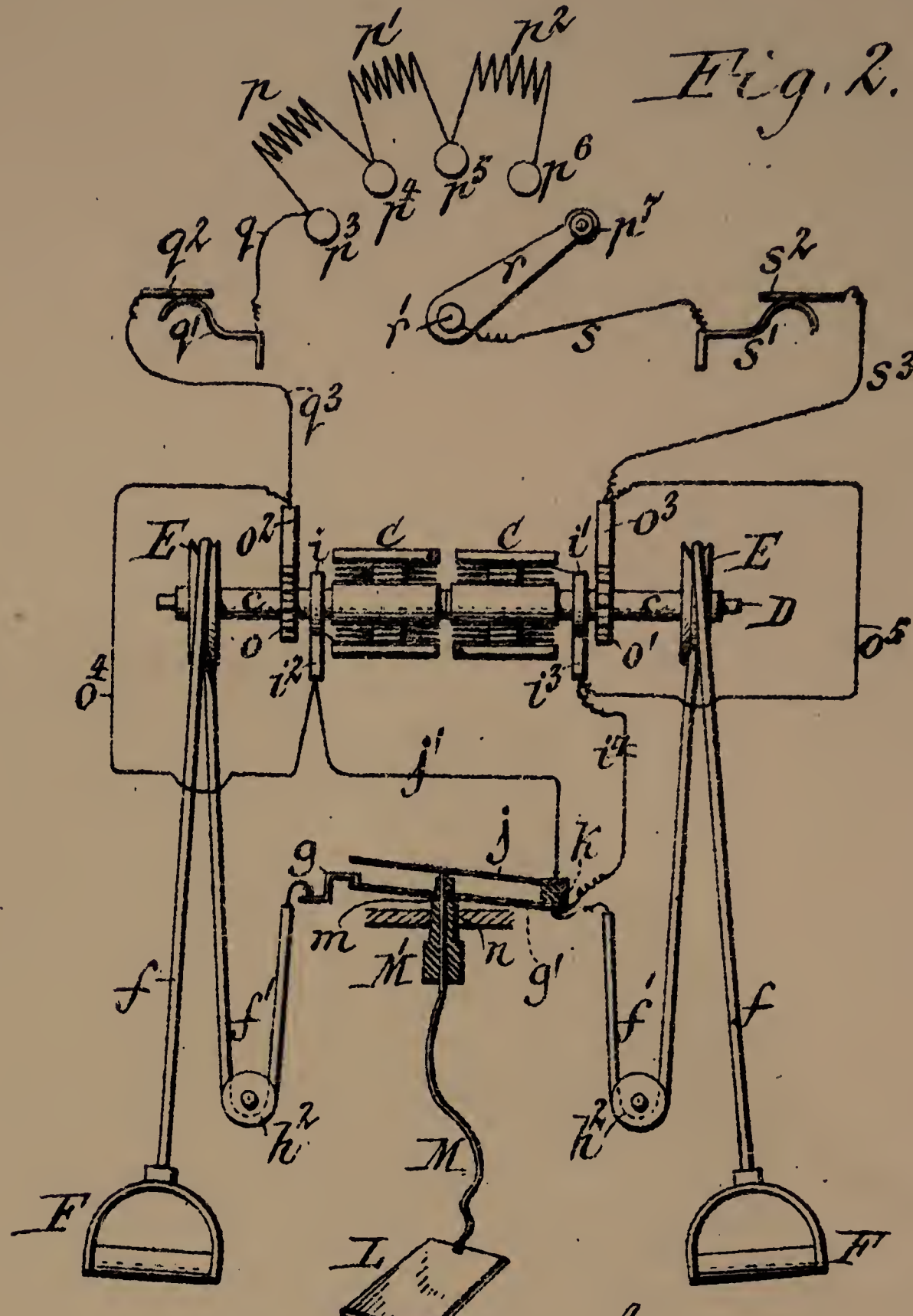


Fig. 4.

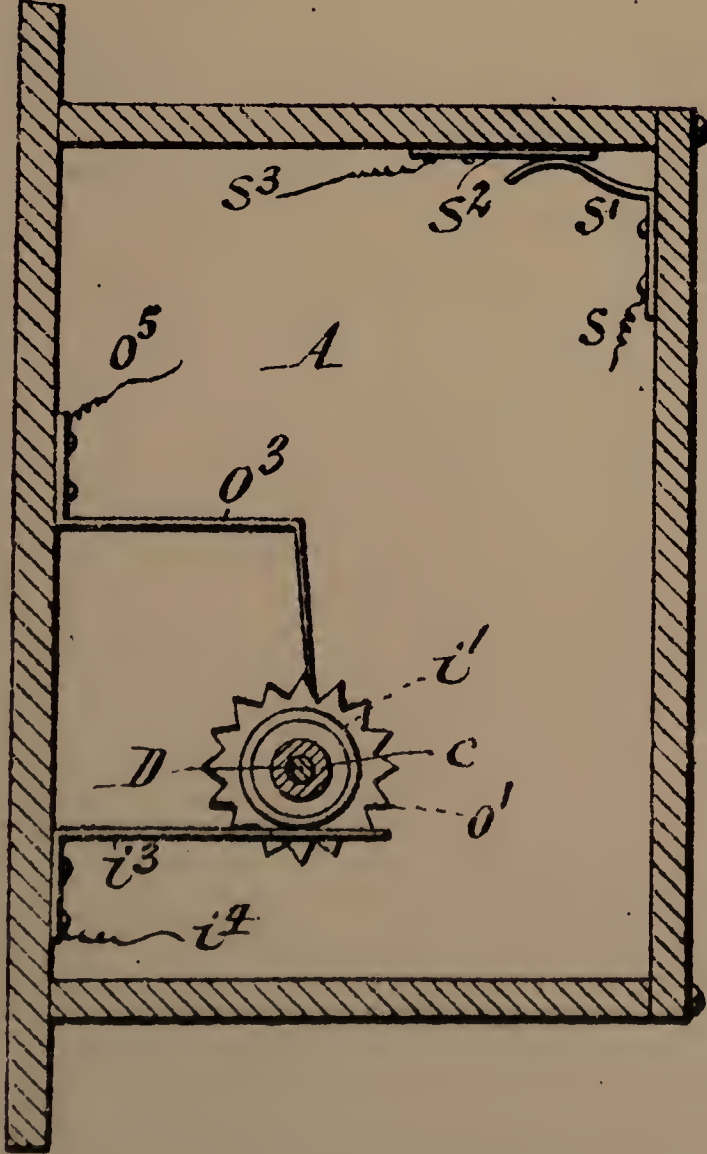
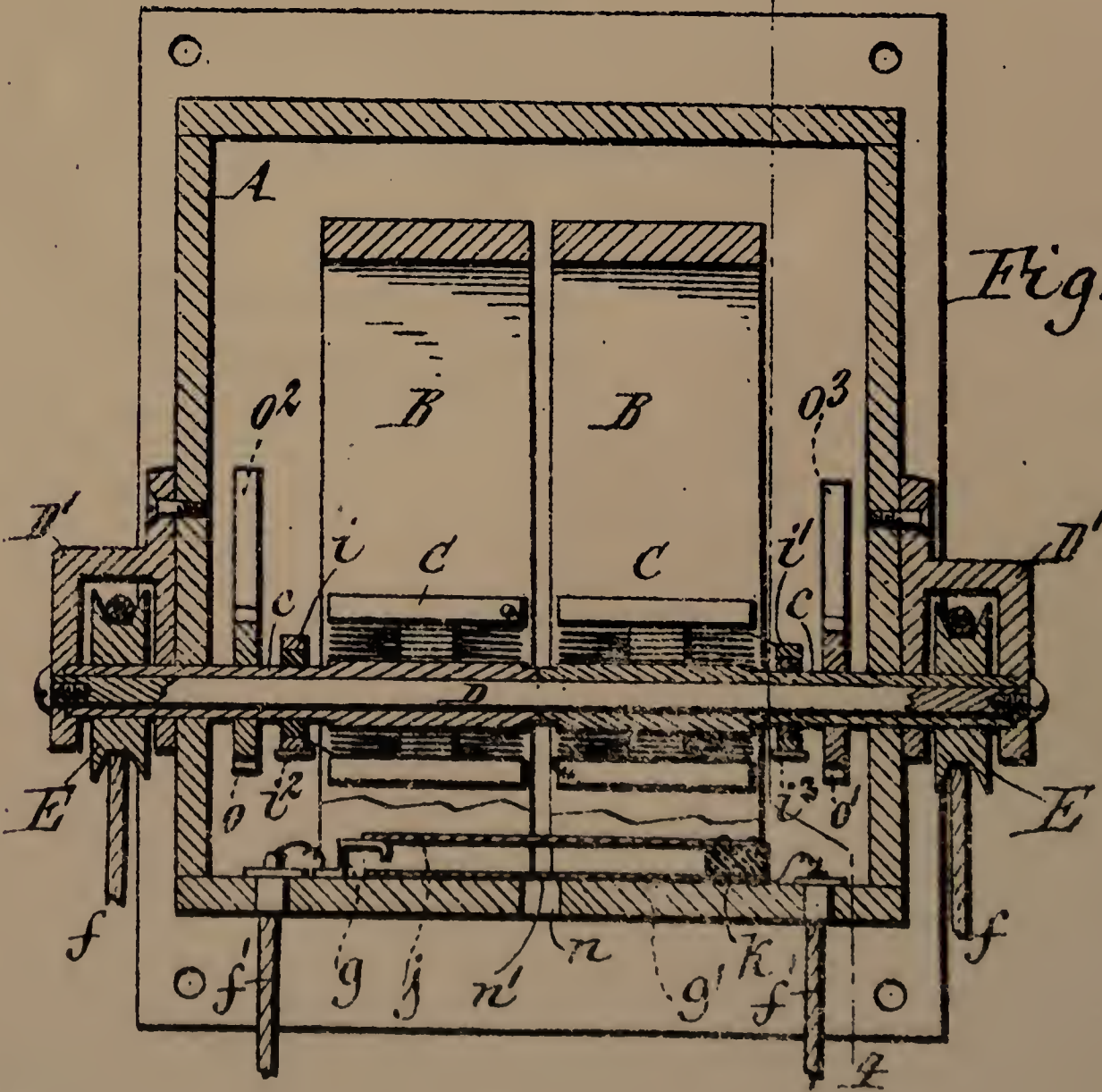


Fig. 3.



[This Drawing is a reproduction of the Original on a reduced scale.]

